

# Douglas Fontes

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## **Academic background**

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University of Central Florida, Computational Fluid and Aerodynamics Laboratory

Concentrations: two-phase flow, rarefied gas flow, CFD.

Research Overview: Numerical simulations of rocket jet plume interacting with lunar soil. Numerical modeling of rarefied flows with particulate using RANS and DSMC (Direct Simulation

Thesis Title: “Numerical simulation of the flow of dispersions based on transformer oil in closed cavities”

Concentrations: Numerical simulation, heat transfer, nanoparticles, electrical transformers, nanofluids

Research Overview: Numerical simulations of natural convection of the dispersion of nanoparticles in the transformer oil inside a cavity. Experimental measurements of the nanofluids were obtained. A numerical code written in C language was implemented to solve the evaluated cases. (Advised by Dr. Enio Pedone Bandarra Filho and Dr. Elie Luis Martinez Padilla).

Federal University of Uberlândia (Universidade Federal de Uberlândia - UFU), Brazil

Concentrations: Aerodynamics, computational fluid dynamics, and mechanical design.

Research Overview: Numerical calibration of devices of pressure reduction to measure the flow rate. Turbulent flow was considered, and discharge coefficients were calibrated for the experimental measurements (supervised by Dr. Francisco José de Souza).

Period	Role	Program/Sponsor	Amount for the Period
March 2021 - February 2022	Postdoctoral Research Scholar	Preeminent Postdoctoral Program-P3/UCF	\$ 29,583.00 (USD)
February 2019 - February 2021	Postdoctoral Research Scholar	Preeminent Postdoctoral Program-P3/UCF	\$ 60,000.00 (USD)
March 2015 - August 2018	Graduate Research Scholar	Academic Excellence Program/CAPES - Brazil	R\$ 92,400.00 (BRL)
March 2013 - February 2015	Graduate Research Scholar	Academic Excellence Program/CAPES - Brazil	R\$ 35,850.00 (BRL)
August 2012 - December 2012	Undergraduate Research Scholar	NANBIO/CAPES - Brazil	R\$ 2000.00 (BRL)
January 2006 - December 2007	High School Scholar	Junior Scientific Initiation Program (PIC)/CNPq - Brazil	R\$ 1,200.00 (BRL)

# Research

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	Souza			Minas Gerais - Brazil	
February 2017 - December 2018	Dr. Francisco José de Souza	Numerical simulation of multiphase flow inside load dispersers of catalytic cracking (#2015/00334-1)	Graduate Researcher	Petrobras Oil Company - Brazil	R\$ 887,453.36 (BRL)
March 2013 - February 2015	Dr. Enio Pedone Bandarra Filho	Heat transfer enhancement in nanofluid flow considering natural convection	Graduate Researcher		

4. Fontes, D. H., Ribeiro Duarte, C. A., & de Souza, F. J. (2018). Numerical Simulation of a Water Droplet Splash: Effects of Density Interpolation Schemes. *Mechanics Research Communications*, 90, 18–25. <https://doi.org/10.1016/j.mechrescom.2018.04.003>

5. Fontes, D. H., Ribeiro Duarte, C. A., de Souza, F. J., & de Souza, F. J. (2019). Improved Hybrid Lattice Boltzmann Method Applied to Liquid Jet in Crossflow. *International Journal of Multiphase Flow*, 114, 98–114. <https://doi.org/10.1016/j.ijmultiphaseflow.2019.02.009>

6. Fontes, D. H., Ribeiro Duarte, C. A., & de Souza, F. J. (2018). Numerical Simulation of a Water Droplet Splash: Effects of Density Interpolation Schemes. *Mechanics Research Communications*, 90, 18–25. <https://doi.org/10.1016/j.mechrescom.2018.04.003>

7. Fontes, D. H., Padilla, E. L. M., dos Santos, D. D., & Bandarra Filho, E. P. (2017). Numerical Study of The Natural Convection of Nanofluids Based on Mineral Oil with Properties Evaluated Experimentally. *International Communications in Heat and Mass Transfer*, 85, 107–113. <https://doi.org/10.1016/j.icheatmasstransfer.2017.05.003>

8. Fontes, D. H., Ribatski, G., & Bandarra Filho, E. P. (2015). Experimental Evaluation of Thermal Conductivity, Viscosity and Breakdown Voltage AC of Nanofluids Of Carbon Nanotubes and Diamond in Transformer Oil. *Diamond and Related Materials*, 58, 115–121. <https://doi.org/10.1016/j.diamond.2015.07.007>

9. Fontes, D. H., Dall, D., Luis, E., Padilla, M., Pedone, E., & Filho, B. (2015). Two Numerical

6. **Fontes DH.**, Mantovani

19. **Fontes, D. H.**, Souza, F. J. De, & Meira, L. S. (2019). A Hybrid Approach Applied to Spray in Liquid Jet in Crossflow. ILASS-Americas 30th Annual Conference on Liquid Atomization and Spray Systems, Tempe, AZ, May 2019, (May), 13.
20. **Fontes, D. H.**, Meira, L. S., Canabarro, L. R., Souza, F. J. De (2019). A Hybrid approach for modeling sprays in crossflow. 10<sup>th</sup> International Conference on Multiphase Flow, Rio de Janeiro, Brazil, May.
21. **Fontes, D. H.**, & de Souza, F. J. (2017). Numerical Analysis of Jet in Crossflow Spray. 24th ABCM International Congress of Mechanical Engineering, 3–8.
22. **Fontes, D. H.**, dos Santos, D. D., Padilla, E. L. M., &





# Teaching

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During this period, teaching activities were performed for Mechanical Engineering classes. Projects based on the acquired knowledge in the class were made. Interactive material was provided to help in the learning process. As a member of the faculty, periodic meetings to discuss improvements on the teaching/learning process were attended.

Number of students per class	Class hour per week	Courses per semester	Teaching evaluation (1 - 6)
~60	~10	~3	5.2

Citations	Hours/Semester	Total hours
Transport Phenomena	80	80
Introduction to the Engineering	40	200
Resistance of Materials	40	80
Analytical Geometry	80	80
Calculus 3	80	240
Mathematics	80	160

George Loubimov

University of Central Florida    
 Orlando, FL, USA    
 02/2019-08/2020  
 Support mentoring

Caroline Anderson

University of Central Florida    
 Orlando, FL, USA    
 02/2019-08/2020



## Service

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**Role**

Fluids Engineering Division Summer Meeting FEDSM 2021 (2021)

COBEM (International Congress of Mechanical Engineering-Brazil) (2019)

CONEM (National Conference of Mechanical Engineering-Brazil) (2014)

UCF Internal Revision: Project Call Request for White Paper/Prototype Proposal Number: TEES/JHTO-RPP-2021-001, University Consortium for Applied Hypersonics

: Internship in the area of Planning and Maintenance Engineering of BRF Company, located at Uberlandia, Minas Gerais. The main activities were to monitor the maintenance plan and analyze the efficiency of the food freezing processing.

<b>Course</b>	<b>Time (hours)</b>	<b>Year</b>
Preparing Tomorrow's Faculty	24	2021
Teaching and Learning in American Universities	16	2021
Fostering Excellence and Understanding in the Classroom	10	2020
First Steps in Research	2	2018
New Technologies of Learning	5	2018
Fundamentals of acoustic	4	2014
Submarine Engineering		

<https://www.ucf.edu/news/self-assembly-landing-pads-for-the-moon-ucf-researchers-are-working-on-it/>